[illegible] 1146

REMARKS

2138

On a BOOK, intitled,

An Enquiry into the Nature of the Human Soul.

WHEREIN THE

Immateriality of the SOUL

Is evinced from

The Principles of Reaſon *and* Philoſophy.

PROVING,

From the ſame PRINCIPLES, that the AUTHOR's
FUNDAMENTAL PRINCIPLE is falſe,
and conſequently all his ſubſequent Reaſonings
and Concluſions, ſo far as they depend upon the
ſaid Principle, are without Foundation.

Wimpey (J.)

In a LETTER *to a FRIEND.*

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Interdum vulgus rectum videt. Hor. lib. 2. ep. 1. 63.

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BRITISH MUSEUM

REMARKS

On a BOOK,

INTITLED,

An Enquiry into the Nature of the Human Soul, &c.

REVEREND SIR,

I HAVE a ſecond time read over the *Enquiry into the Nature of the Human Soul*; and though I agree with you it is an extraordinary performance, and proves the author to be very ingenious and learned, yet I cannot but continue to think his fundamental principle is wrong, as I intimated to you when I had the favour of your company laſt. At your inſtance I have ventured to make ſome remarks on the firſt ſection, in which I have exhibited theſe reaſons which have prevail'd upon me to diſſent from the author. I am very ſenſible this performance hath gained him the reputation of a very cloſe and exact reaſoner amongſt the learned, and thoſe who have a reliſh for enquiries of this kind; in all which I heartily concur. But ſhould the moſt accompliſh'd architect exert his utmoſt ſkill in erecting a fabric, the moſt complete of its kind both for ornament and uſe, it certainly would not fail to ſtrike the eyes of judicious ſpectators with great pleaſure; nor could they, without ingratitude, refuſe to join in his praiſe. But ſhould he build it on a ſandy foundation, which wou'd be altogether inſufficient to ſupport it, this would render it perfectly uſeleſs; tho' whilſt it remain'd, 'twou'd be an inconteſtable proof of the builder's art. To apply this to the ingenious author. He has with wonderful ſkill choſe his materials, and form'd them into arguments, which he has rang'd in a manner that proves him a clear, ſtrong, and accurate reaſoner. But ſhould his foundation be ſandy, his beautiful ſuperſtructure muſt inevitably tumble, and become uſeleſs; tho' it muſt be deemed a laſting evidence of the author's ſkill in the art of reaſoning. That I ſhould ſo freely animadvert upon the performance of ſo great a man, may, probably, be deem'd the effect of a very great degree of preſumption; and, perhaps, I may thereby get the infamous character of an Atheiſt: ſeeing his deſign, as he profeſſes, is to demoliſh, and perfectly overthrow what theſe men have advanced to prove there is no Deity, or governing mind in the univerſe. But that ſelf-exiſtent and abſolutely Being, whoſe exiſtence theſe wilfully blind, mad wretches, deny, is my witneſs, I write with no ſuch impious view, as tends to weaken the proofs of his exiſtence; but am humbly of opinion, that as there are inconteſtable proofs, demonſtrations perfect in every part, that ſuch a moſt perfect Being or Firſt Cauſe muſt have eternally exiſted; ſo, to admit any thing as proof which is not really ſo, or of any argument, whoſe firſt principle is not ſelf-evident, nor can be demonſtrated to be true, is not to ſerve the cauſe of the Almighty, but to give our adverſaries (thoſe that deny his exiſtence) an occaſion of being witty with our miſtakes, and of vainly triumphing over us. In order to extenuate the charge of preſumption, it may not be amiſs to obſerve here, that the deſign of writing ſhould be the benefit and inſtruction of the reader; which, no doubt, was not the leaſt part of the author's intention in his work: But as every reader is, and ought to be at liberty to publiſh his doubts, in order to a thorough ſatiſfaction; ſo, I hope, the author will kindly pardon the great freedom I have taken with him, and defend his own work, by ſhewing the inconcluſiveneſs of my arguments. For, in this Enquiry, my intention is to ſeek out truth, without being ſolicitous which of us have the happineſs to find it. I now, Sir, beg leave to lay before you the remarks, without making any farther apology either for them, or myſelf.

He that undertakes to demonſtrate, from the principles of reaſon and philoſophy, that omnipotent power cannot make matter capable of thinking, muſt prove (I conceive) that either the eſſence of matter is ſuch, that thinking, perception, reflexion, *&c.* are properties which cannot, by any poſſible means, be ſupported by matter. Or that the primary affections or properties of matter, ſuch as extenſion, ſolidity, and a power of receiving and communicating motion by impulſe, (which properties we cannot conceive matter can exiſt without) are incompatible with thinking, perception, reflexion, *&c.* and ſo cannot poſſibly inhere together in one and the ſame ſubject, or be ſupported by it.

But becauſe the internal nature, eſſence, conſtitution, or ſubſtance of all beings, whether ſpiritual or material, is not the object of any of our ſenſes; nor can it be diſcovered by any reflex acts of our minds, what that ſubſtratum, or ſupport is, in which theſe different properties we experience in body and ſpirit inhere; therefore the only way left to diſcover whether matter and ſpirit differ eſſentially, is to compare together the different properties reſulting from both, and to examine if they are inconſiſtent with, and deſtructive to the exiſtence of each other. If they are found ſo, we may rationally conclude, that one ſubſtance cannot ſupport ſuch inconſiſtent properties. But if, upon examination, they are not found to be deſtructive of each other, it follows, we cannot demonſtrate that the ſubſtance of matter is not capable, by omnipotent power, of ſupporting theſe properties, *viz.* perception, thinking, reflexion, *&c.* attributed to ſpirit.

Whether the author, in his *Enquiry into the Nature of the human Soul*, hath thus demonſtrated from the *vis inertiæ* of matter, (which he takes to be a property eſſential to it,) that 'tis not poſſible for even Omnipotence to endue matter with a power of ſelf-motion, thinking, reflexion, *&c.* we are now to enquire. But before I enter upon the enquiry, I judge it neceſſary to define ſome of the terms made uſe of in this enquiry, in order to prevent any miſunderſtanding that might be occaſioned by the promiſcuous uſe of words, without one determinate ſignification annexed to them.

DEFINITIONS.

By matter, I underſtand an extended, ſolid ſubſtance, capable of receiving and communicating motion by impulſe; which properties, if they are not eſſential to, and inſeperable from matter, yet we cannot conceive matter can poſſibly exiſt without them.

By ſolidity, I underſtand that hardneſs, or impenetrability, which is found in all bodies, whereby any body is abſolutely prevented the entering into the place of any other body, tho' forced by the greateſt poſſible power, except the body firſt poſſeſſing be removed.

Or it is that property whereby two bodies are abſolutely incapable of poſſeſſing one and the ſame place, or part of ſpace, at one and the ſame time.

Gravity is a tendency in all bodies to meet and unite with each other; or it is that virtue, or power, which all bodies have of mutually tending towards each other. The force of which in any body is known by its weight.

A *vis inertiæ* is that diſpoſition in bodies to continue in motion, or at reſt, in which ſtate ſoever they are placed, till they are acted upon by a force proportional to the real quantity of matter in them. So that by this term is intended not only a bare inactivity, but alſo a power in bodies to continue in the ſtate in which they are placed, till removed by a greater force.

An impreſſed force is an action exerted upon a body, in order to change its ſtate, either of reſt or of moving, uniformly forward in a right line.

I here beg leave to tranſcribe the nine following *Lemmas* from the ingenious Mr. *Whiſton*'s *New Theory of the Earth*.

" 1. All bodies will perſevere for ever in that
" ſtate, whether of reſt or motion, in which they
" once are, if no other force or impediment act
" upon them, or ſuffer by them.

" 2. All motion is of itſelf rectilinear, and
" with the ſame conſtant uniform celerity, if no
" other external cauſe diſturb it.

" 3. All thoſe ſingle corpuſcles of which bodies
" are compos'd, do attract other ſingle corpuſcles
" of which other bodies are compos'd, and are
" alike mutually attracted by them. If this affection
" of the parts of bodies be conſidered, with re-
" ſpect to thoſe towards which the motion is, 'tis
" called attraction, and they are ſaid to draw all
" others: But if it be conſider'd with reſpect to
" thoſe which are mov'd, 'tis called gravitation,
" or a tendency in them towards others, *&c.*

" 4. This affection of mutual attraction, or
" gravitation is univerſal in extent; all bodies in
" the whole world, as far as we have any means
" of knowing, whereſoever they are placed, be-
" ing in common ſubject thereto, and concerned
" therein.

" 5. This affection is alſo univerſal as to the
" kinds of its objects; it belonging equally to all
" the parts of matter, of what ſort or form, in
" what figure or condition ſoever they are: The
" difference of bodies as to texture and compoſi-
" tion, fluidity and firmneſs, motion and reſt,
" bigneſs and ſubtilty, or any other ſuch mutable
" qualities, not in the leaſt diminiſhing the influ-
" ence thereof.

" 6. This affection is alſo univerſal and equable
" as to time, without all manner of intermiſſion,
" without any increaſe or diminution in different
" ages.

" 7. The quantity of the force of attraction at
" equal diſtances is exactly proportionable to the
" quantity of matter in the attracting body; be-
" ing, in reality, nothing but the reſult or ſum of
" the united forces of all thoſe ſingle particles of
" which 'tis compos'd. Thus, if A be double to,
" *i. e.* has twice as much matter as B, A will have
" a double force of attraction alſo, at equal di-
" ſtances from their centers reſpectively. If A
" repreſents the earth, B the moon; if B contain
" but the fortieth part of the matter in A, (as it
" really doth contain little more) and a globe or
" ball were placed at the ſame diſtance from the
" center of B, at which another equal to it were
" from that of A, it would be but the fortieth
" part ſo heavy towards B, as the other were to-
" wards A.

" 8. This mutual tendency of bodies is greater
" or leſs, according as the bodies themſelves are
" nearer to, or farther from each other. The
" ſame body more forcibly attracting thoſe which
" are near, than thoſe which are farther off. So
" that a ſtone or pillar which is with us very heavy,
" would be, comparatively, very light if it were
" as far diſtant from us as the moon.

" 9. The proportion of the increaſe and de-
" creaſe of this gravity of bodies in their approach
" to, or receſs from each other, is neither that of
" ſimilar lines, nor ſolids, but of ſuperficies, or
" plains; the force of attraction in ſeveral diſ-
tances

" tances being reciprocally in a duplicate propor-
" tion thereof. Thus when the ſame body with-
" out the ſurface of the earth, is twice as near its
" center as it was before, 'tis four times as heavy;
" when thrice as near, 'tis nine times as heavy;
" when four times as near, 'tis ſixteen times as
" heavy as before. In like manner, the ſame
" ſtrength which were able to ſuſtain a body of
" one hundred weight here, would, at twice our
" diſtance from the earth's center, be equally able
" to ſuſtain four hundred weight; at three times
" our diſtance, nine hundred weight; at four times
" our diſtance, ſixteen hundred weight; and ſo *in*
" *infinitum*, at all other diſtances. For as the
" ſquares of the diſtances increaſe, ſo does the
" power of attraction decreaſe; and as the ſquares
" of diſtances decreaſe, ſo does the power of at-
" traction at the ſame time increaſe proportiona-
" bly; as will be prov'd preſently from the known
" *Phænomena* of aſtronomy."

Having premis'd the foregoing *Lemmas*, let me repreſent the author's main argument in ſhort, which, as I underſtand it, is this. A *vis inertiæ*, or a reſiſtance to any change of ſtate, of reſt, or motion, is eſſential to matter; and to ſuppoſe it capable of a power of motion, is to ſuppoſe it capable of two contrary *connatus's* at once: But two ſuch contrary and inconſiſtent tendencies, planted at once in one and the ſame individual ſubject, is a ſelf-deſtructive notion, and therefore not to be effected by infinite power: for to effect impoſſibilities is not the object of any power; therefore the eſſence of matter is ſuch, that omnipotent power cannot give it a faculty of ſelf-motion. But before we concede to the concluſion, let us be certain the principle from which it is deduced is good. For right reaſoning from falſe principles, produces conſequences as erroneous as falſe reaſoning from right principles. Therefore becauſe this propoſition—*viz.* A *vis inertiæ*, or reſiſtance to any change of place, is eſſential to matter, or is as eſſential a property of matter as ſolidity is—is the principle on which the author's large ſuperſtructure is erected, let us examine accurately into the nature of this property, and ſee whether 'tis eſſential to matter, or ariſes from ſome other thing, allow'd by the author to be extraneous to matter. If the latter is found to be the caſe, I ſuppoſe the author muſt give up the cauſe as indefenſible, at leaſt upon his principle.

Many are the hypotheſes which have been contriv'd to ſolve this univerſal affection of matter, call'd gravity; and tho', for the moſt part, the authors were very ingenious men, and great philoſophers, of whom Sir *Iſaac Newton* is juſtly eſteem'd their prince; he having, as the learned Dr. *Keil* ſays in the preface to his *Introduction to Natural Philoſophy*, "by his prodigious genius, laid "open more and abſtruſer myſteries of nature "than men could ever have hop'd for; and that "all our predeceſſors from time immemorial hath "handed down to us concerning the mechanical "philoſophy, does not amount to the tenth part "of thoſe things which Sir *Iſaac Newton* alone, "through his vaſt ſkill in geometry, has found "out by his own ſagacity:" Yet none of them have ſucceeded ſo well in their hypotheſes, as not to be liable to many weighty objections; and the true cauſe is ſtill unknown as much as ever, and will, moſt probably, remain ſo, it ſeeming to lie very far beyond the ken of human ſight. So, probably, the learned and moſt ingenious Dr. *Edmund Halley* thought, who owns gravity to be an effect unſolvable by any philoſophical hypotheſis, and modeſtly reſolves it into the immediate will of our all-wiſe Creator; who, by appointing this law throughout all the material world, keeps all bodies in their proper places and ſtations, which without it would ſoon fall to pieces, and be utterly deſtroyed.

Now whether the true cauſe is ſome inherent power exiſtent within, and ariſing from the internal frame, conſtitution, or eſſence of matter; or whether this cauſe has its ſeat in ſome ſubtile elaſtic fluid, which by ſome is ſuppoſed to pierce all bodies, and impel their elements or component particles with a force proportional to their number, or to the real quantity of matter in the body on which it acts; or whether matter, any other how modified or qualified, impinges on bodies, and produces this effect; or laſtly, whether it is owing to the conſtant, uninterrupted agency of ſome immaterial being, or whether the effect is produced by any other means yet unthought of, this is certain, that the thing itſelf, whatever its cauſe be, is perpetual and univerſal, without any kind of intermiſſion, increaſe, or diminution, where all circumſtances are the ſame.

By the 8th and 9th *Lemma's*, the ſame quantity of matter, or the ſame body, gravitates more or leſs, or is more or leſs heavy, as the body is nearer to, or farther from the central body towards which it gravitates; and that reciprocally, in a duplicate proportion of the diſtance of the two bodies univerſally. Now let us ſee what we can learn from this one immutable univerſal law of gravity, *viz.* That as the ſquares of the diſtances of bodies increaſe; ſo does the power of attraction, or gravitation, or their weight decreaſe. And as the ſquares of the diſtances decreaſe, the power of attraction, or gravitation, or their weight increaſes proportionably. Hence we ſee that ſtrength which is able to ſuſtain or move a body of one hundred weight here, would, at twice our diſtance from the earth's center, be equally able to ſuſtain or move four hundred weight; and at ten times our diſtance, one hundred hundred weight; and at a hundred times our diſtance, ten thouſand hundred weight; and at a thouſand times our diſtance from the earth's center, one million hundred weight; and ſo *in infinitum.* And were the weight of any body equal in bulk to our earth preciſely known, ſuppoſing it on the ſurface of our earth, or at one ſemidiameter's diſtance from its center, it would be no difficult taſk to calculate at what diſtance from our earth, if ſuch a body were placed, it would be eaſy for an ordinary man to put ſuch a body in motion by a ſingle blaſt of his breath. For as the ſquares of the diſtances increaſe, the force of gravity, or the weight, decreaſes; therefore the greateſt body gravitating towards any center, might be remov'd to ſo great a diſtance, that its weight would become ſo ſmall as to be overcome and actually be put in motion by ſo ſmall a force as a ſingle blaſt of a man's breath. This I take to be as evident to thoſe who are ſatisfy'd of the truth of this propoſition—*viz.* As the ſquares of the diſtances of bodies increaſe, ſo does the power of gravity, or their weight, decreaſe—as demonſtration can make it. If any one ſhould heſitate concerning the truth of this propoſition, he may find it clearly demonſtrated in moſt modern books of natural philoſophy, particularly in Sir *Iſaac Newton*'s *Mathematical Principles*, Book I. and in Mr. *Whiſton*'s Lectures, Propoſition the 13th. The truth of this propoſition being eſtabliſhed, let us enquire how this agrees with a ſuppoſition that a *vis inertiæ*, or a reſiſtance to any change of ſtate, of reſt, or motion, is eſſential to, and inſeparable from matter. I ſay then, if ſuch a reſiſtance to any change of ſtate, of reſt, or motion, is as eſſential to, and inſeparable from matter as ſolidity, then the ſame body will require the ſame force to ſuſtain or move it in all places, poſitions, conditions and circumſtances whatſoever; but it is demonſtrable as above, that the ſame body, at twice our diſtance from the earth's center, requires but a fourth of the force to ſuſtain or remove it as here on the earth's ſurface; and at a thouſand times our diſtance, 'twould require but one ten hundred thouſandth part of the force as with us; and ſo *in infinitum*. Therefore I conclude that a *vis inertiæ*, or a reſiſtance to any change of ſtate, of reſt, or motion, is neither eſſential to, nor inſeparable from matter.

Again, if ſo ſmall a force as a ſingle blaſt of a man's breath, or, ſay, the ſmalleſt poſſible force, is ſufficient to ſuſtain, remove or give motion to ſo vaſt a maſs of matter as the whole earth, (or, if you pleaſe, to all the bodies in the ſolar ſyſtem, ſuppoſing them amaſs'd into one body, and free from the power of gravity, as 'tis demonſtrable it is,) then where is this *vis inertiæ* to be found? And what is its quantity in ſo immenſe, and almoſt inconceivable a maſs of matter, which is not ſufficient to counter-act, and render ineffectual the ſmalleſt poſſible force? Hence 'tis very plain to me, that a *vis inertiæ* is not eſſential to, and inſeparable from matter; but that it ariſes from, and is always proportional to the force of gravity in all bodies, whatſoever circumſtances they are in: That is, the ſame body on the earth's ſurface requires four times the force to ſuſtain, or remove it, that it doth at twice that diſtance from the earth's center. Or its gravity or weight, is four times as great in one caſe as in the other; and ſo four times the force is as neceſſary to give motion to it in one caſe, as once the force in the other.

Let any man reflect ſeriouſly upon his own obſervations, and the experiments he hath made upon matter, as to ſuſtaining, thruſting, pulling, carrying, or giving motion to any body after any manner or ſort whatſoever, and then let him tell me if the force neceſſary to effect any of theſe various motions is not always proportional to the weight in any body? Does not a double weight always require a double force, or a double ſtrength, to give motion to, or to ſuſtain it? a triple weight a triple force, and ſo *in infinitum?* I ſay, if the force neceſſary to effect any of theſe, or any other motion, is ever proportional to the gravity or weight of bodies; and if the gravity, or weight of bodies is not inherent in them, as the author maintains, but the effect of ſome power extraneous to matter, I deſire to know what notion or idea any man hath of matters reſiſting any change of ſtate, of reſt, or motion from any power, eſſential to, and inſeparable from matter, when thus diveſted of its weight? Can any man conceive that any body, tho' ever ſo great, that is not actuated by the force of gravity, or that weighs nothing, makes any reſiſtance to being put in motion? Don't we find that a ſmall force will ſuſtain or give motion to a body whoſe weight is ſmall; and that a greater force is neceſſary to give motion to a body whoſe weight is greater, whether the bodies are ſmall or great? And if the force neceſſary to be impreſs'd to give motion to any body is always proportional to its weight, is it not very plain where there is no weight in any body there needs no force to overcome weight? or, which is the ſame thing, there needs no force to put it in motion upon the account, or becauſe of weight? Therefore may we not ſafely conclude, that ſince the reſiſtance matter makes to be put in motion is always proportional to its weight, or ſince the force neceſſary to put matter in motion always decreaſes as the weight of ſuch matter decreaſes; I ſay, may we not ſafely conclude, that where there is no weight there is no reſiſtance to motion; and, conſequently, that a *vis inertiæ*, or a reſiſtance to any change of ſtate, of reſt, or motion, is not eſſential to, and inſeparable from matter, but depends upon the force or power of gravity? If it ſhould be ſaid, all this is upon a ſuppoſition, that the power or force of gravity is ſomething extraneous to matter; but if the cauſe of gravity inheres in matter, or is eſſential to it, is not this reſiſtance to motion alſo eſſential to it? I anſwer, that way you will incur the very thing the author denies. For gravity is a real active force or power capable of giving motion to the largeſt bodies; and is that force, or power, which retains the planets, and their Satellites, or moons, in their reſpective orbits. So that inſtead of proving matter is incapable of a power of ſelf-motion, you make a ſelf-motive power eſſential to, and inſeparable from matter.

Again, if a *vis inertiæ*, or a reſiſtance to any change of ſtate, of reſt, or motion, is eſſential to matter, and is a diſtinct reſiſtance from that of gravity or weight in bodies; then, I ſay, their reſiſtance to motion is a force compounded of theſe two reſiſtances; and the weight of bodies will not decreaſe as the ſquares of the diſtances increaſe. For let R repreſent the ſuppos'd eſſential reſiſtance in any body, and G the power or force of gravity of the ſame, and W its whole weight: then the whole reſiſtance in that body will be $R+G=W$. Let us ſuppoſe its diſtance from the earth's center to be twice as great as before, then the whole weight of bodies at ſeveral diſtances being reciprocally in a duplicate proportion thereof, its whole reſiſtance will then be $\frac{R+G}{4}$; but if the reſiſtance repreſented by R is eſſential, and continues the ſame at all diſtances, its weight will be $R+\frac{G}{4}$ at this diſtance, which is $\frac{3}{4}$ of R more than its whole weight at this diſtance, which is contrary to the known phænomena of aſtronomy; for from thence 'tis demonſtrated, that the weight of bodies decreaſe as the ſquares of the diſtances increaſe; therefore I conclude, that a *vis inertiæ*, or a reſiſtance to any change of ſtate, of reſt, or motion, is not eſſential to matter. The ſame thing plainly appears from the following familiar inſtance. Suppoſe a pair of ſcales *in equilibrio* be loaded each with ten million hundred weight, the weights being equal, the *equilibrium* will be preſerved; let us ſuppoſe them ſo accurately made that the friction may be inconſiderable, or no greater than it is in our very fine ſmall ſcales, which being ſo very ſmall may be neglected; ſuppoſe alſo the reſiſtance of the *medium* to be nothing; then, I ſay, that ſo ſmall a weight as a drachm, or even the thouſandth part thereof, being added to the weight in one of the ſcales, the *equilibrium* is immediately deſtroy'd, the ſcale to which the weight, (tho' ſo very ſmall) is added, preponderates, whilſt the other is raiſed. From hence 'tis very plain, that the whole, *viz.* twenty million hundred weight is put in motion by ſo ſmall a force as the gravity of one thouſandth part of a drachm. Was there ſuch a property as a *vis inertiæ*, or a reſiſtance to any change of ſtate, of reſt, or motion, eſſential to and inſeparable from matter, and its reſiſtance, force, or power, always proportional to its quantity, can it be conceived poſſible that ſo ſmall a force as the gravity or weight of the thouſandth part of a drachm, ſhou'd be ſufficient to put twenty million hundred weight, or, it may be ſaid, a million million (or as many as you pleaſe) hundred weight in motion? If any one, notwithſtanding this, ſhou'd have ſtrength enough of imagination to fancy that ſuch a reſiſtance is eſſential to matter, and always proportional to the quantity of matter in any body, I would deſire him to tell me what is the quantity of this eſſential reſiſtance in the thouſandth part of a drachm, ſeeing this reſiſtance in twenty million hundred weight bears no proportion, that we can diſcover, to the gravity or weight of the thouſandth part of a drachm. When he has done this, and publiſh'd his method of inveſtigation, I promiſe to become his convert. Upon the whole, let me aſk, if it does not moſt evidently appear, that a *vis inertiæ*, or a reſiſtance to any change of ſtate, of reſt, or motion, is not eſſential to, and inſeparable from matter? And doth it not as plainly appear, that the *vis inertiæ* ariſes from, and is always proportionable to that perpetual, univerſal affection of matter, call'd gravity; which the author maintains is not the action of matter upon matter, but the virtue or power of an immaterial cauſe or being conſtantly impreſs'd upon it. But if gravity is not eſſential to, and inherent to matter, the *vis inertiæ* depending wholly on this principle, without which it would not exiſt, cannot poſſibly be eſſential to it.

The conſequence of this reaſoning, I think, is the total overthrow of the author's fundamental principle, and, conſequently, all his concluſions drawn from thence. But having only exhibited my reaſons for diſſenting from the author, let us examine now what he has advanced for the ſupport of his fundamental principle. To begin then with his ſecond paragraph, in which he maintains, " that to move any body as A, with a " given celerity as C, a certain force is neceſſary " to be impreſs'd; and to move it with a celerity as twice C, twice that force is neceſſary; " and to move it with a celerity as thrice C, " thrice that force is neceſſary; and ſo on," (all which I conceive is true, and will hold univerſally) " therefore, ſays he, it follows, that " the body A, makes a certain reſiſtance before " it can be moved with a velocity as C, for other- " wiſe the force would not be neceſſary, if, to wit, " it did not make this certain degree of reſiſtance " to render it neceſſary." Anſwer, that all bodies upon, or near the earth's ſurface, reſiſt in proportion to the real quantity of matter in them, is very evident from experience. But then 'tis as evident, that all ſuch bodies are under the active power or force of gravity. All that this proves then is, that in order to give motion to any body, a force is neceſſary in proportion to the real quantity of matter in that body, and to the degree of velocity required; but whether upon the account of force impreſs'd *ab extra*, as that of gravity, or whether from an eſſential inherent force, this determines not. If the author by ſaying, for otherwiſe the force would not be neceſſary, if, to wit, it did not make this certain degree of reſiſtance to render it neceſſary, means, if there was no reſiſtance in any body, no force wou'd be neceſſary to put it in motion; I conceive this is wrong. For matter not being endued with a power of ſelf-motion, but a ſubſtance purely paſſive, if once at reſt, would continue ſo eternally, whether you ſuppoſe a *vis inertiæ* eſſential to it or not, unleſs put in motion by ſome external cauſe or agent. Therefore the force is not neceſſary, becauſe A is a reſiſting body, but becauſe A is a paſſive, inactive ſubſtance, and deſtitute of a power of ſelf-motion.

Nº 4. he ſays, "If inſtead of different celerities we take the quantity of matter different, "the appearance is equally conſtant and certain, "and the conſequence of it the ſame: that is, "if a certain degree of force is neceſſary to move "A with a celerity as C; then twice A will require twice that force, and thrice A will require thrice that force to be moved with the "celerity C." All this is true indeed, ſo long as a real force is impreſs'd upon it from without, ſuch as that of gravity is; for that being always as the real quantity of matter, three times A will gravitate towards the center of the earth with three times the force of A, and ſo will neceſſarily require three times the force to put it into motion. But if we conſider matter as matter, that is, as it is in it ſelf without being acted upon by any external force, ſuch as gravity or the like, then I ſay, a body equal to three times A, will require no more force to put it in motion, or to move it with the celerity C, than once A: For if one fourth of the ſtrength or force neceſſary to ſuſtain, or remove one hundred weight on the earth's ſurface is ſufficient to ſuſtain, or remove the ſame weight at twice that diſtance from the earth's center; or, which is the ſame thing, if the ſame ſtrength or force that is neceſſary to ſuſtain, remove, or put in motion one hundred weight on the earth's ſurface, is ſufficient to ſuſtain, remove, or put in motion four hundred weight at twice, or nine hundred weight at thrice that diſtance from the earth's center, and ſo *in infinitum* (the force of gravity decreaſing reciprocally in a duplicate proportion of the diſtance from the earth's center, according to *Lemma* the 9th;)

then I ſay, where gravity, nor no other external force acts, three times, or a hundred times A will require no more force to put it in motion than once A, which I think is moſt evident; for if four times or nine times A, at twice or thrice its firſt diſtance from the center, requires no more force to put it in motion than once A at one diſtance, only becauſe the gravitating force decreaſes in the proportion aforeſaid; is it not moſt conſpicuous, that where there is no gravitating force or power, there no force is neceſſary to put it in motion? that is, no force is neceſſary becauſe of a *vis inertiæ*; for where there is no reſiſtance, no force can be neceſſary to overcome reſiſtance. Therefore I ſaid before, and with good reaſon I think, that no external force is neceſſary to put a body in motion, becauſe of its reſiſtance; but becauſe matter is an inactive ſubſtance, and incapable of giving a power of ſelf-motion to it ſelf. N° 5. contains nothing but what has been already conſidered.

N° 6. he ſays, "Moreover all this is likewiſe "certain, taken the contrary way, *viz.* from motion to reſt; as far at leaſt as experience reaches." I grant, what force ſoever is neceſſary to move any body with a given velocity, the ſame degree of force is alſo neceſſary to deſtroy that motion, and produce reſt. But that twice or thrice A, requires twice or thrice the force to put it in motion as once A doth, I conceive is not true, unleſs acted upon by ſome extraneous force, as gravity or the like. Nor can it be proved from experience, for no trials have been made yet either to give motion to, or deſtroy it in bodies where gravity acts not. N° 7. he ſays "theſe are the moſt general "certain phænomena of motion, agreeable to univerſal experience, the common ſenſe of men, "and to reaſon it ſelf." 'Tis true, all the experiments that have been made of communicating motion to bodies, and alſo of deſtroying motion in bodies, and producing reſt, confirm what he hath advanced concerning the forces neceſſary in the preſent circumſtances of things, to give or deſtroy motion in bodies; that is, while they are acted upon by ſo powerful a principle as gravity is: For ſure no body will ſay our experience is more extenſive than the power, or force of that univerſal principle. But in order to have made good his argument, he ſhould have proved, that theſe laws obtain univerſally, and would do ſo, if the force of gravity ſhou'd be ſuſpended or annihilated; ſince he maintains, that the *vis inertiæ* of matter, makes theſe different forces neceſſary, in order to give or deſtroy motion in thoſe different bodies, and that the *vis inertiæ* is eſſential to, and inſeparable from matter: that is, that quality or property in bodies, which makes the forces neceſſary to give, or deſtroy motion in body, is eſſential to, and inſeparable from body; and therefore the ſame body in all circumſtances and conditions requires the ſame force, a greater body a greater force, a leſs body a leſs force, and ſo proportionably in all bodies, at all times and in all places, as well at the diſtance of a hundred or a thouſand ſemidiameters of the earth, as on its ſurface. But this is too palpable an abſurdity to be embraced by any one, who has but a ſmall underſtanding in natural philoſophy.

Nº 8. he ſays, " All that is ſaid then, amounts " at laſt to this; that the body A, (that is any " given body) makes a reſiſtance to any change " of the ſtate it is in, whether of reſt or motion, " in all poſſible ſuppoſitions." I anſwer, all bodies reſiſt a change of ſtate in proportion to the force of gravity, or any other force impreſs'd *ab extra*, with which they are actuated in ſuch ſtate. But put the ſuppoſition, that any body is ſo far removed from the center it reſpects, as that their mutual attraction may be infinitely ſmall, or nothing (which is a poſſible ſuppoſition with him at leaſt, ſince he maintains that gravity is not eſſential to matter;) I ſay then, this reſiſtance will be infinitely ſmall, or nothing, becauſe 'tis moſt apparent, that the reſiſtance a body at reſt makes to motion, is always proportionable to the force of gravity, or its weight; and the reſiſtance a body in motion makes to be brought to reſt, is always proportionable to the degree of force impreſs'd upon it, to give it that degree of velocity. A little lower in the ſame ſection he ſays, "when a body is at reſt, it makes reſiſ-"tance to be mov'd with any celerity as C; and "when it moves with any celerity as C, it makes "a reſiſtance to be moved with any other cele-"rity as twice C, or half C, nor doth it make leſs "reſiſtance, if moving, to be brought to reſt a-"gain: And this is true of all poſſible directions "the body can be ſuppoſed to move in; that "is, body or matter makes a reſiſtance to any "change of the ſtate of reſt or motion it is in; "or exerts a certain force, if acted upon (which is "not fully enough expreſs'd by being barely called "a tendency,) to continue and defend it ſelf (to "uſe ſuch a metaphorical term) in the ſame ſtate "of motion or reſt in which it is, and wou'd "becauſe of this reſiſtance, remain in that ſtate "for ever, unleſs ſome external cauſe or agent "(that is, by the terms, ſomething not mat-"ter) impreſs'd a force upon it, to make a change "in its preſent ſtate." I have already obſerved, that a body at reſt, and under the influence of ſome external force, or power, ſuch as that of gravity, requires a force greater than ſuch external force to put it in motion. What he hath here ſaid of the reſiſtance a body at reſt makes to be moved with any given celerity, is without having any regard at all to the force impreſs'd by gravity, as I take it; but is ſuppoſed by him to inhere in, and be eſſential to matter, whether gravity acts or not: but this is not demonſtrable from experience, for reaſons before given. Nor is it becauſe of this reſiſtance that matter or body wou'd continue in its preſent ſtate of motion or reſt, unleſs ſome external cauſe or agent impreſs'd a force upon it, to make a change in its preſent ſtate: For ſuppoſe A, (that is, any given body) to be at reſt, and perfectly free from all kinds of external force; I ſay, ſome force is neceſſary to put the body A in motion, notwithſtanding it makes no reſiſtance to motion, or tho' there was no ſuch negative power as a *vis inertiæ* eſſential to and inſeparable from matter. For any body at reſt not indued with a power of ſelf motion, can never commence motion, or change its ſtate of reſt, to that of motion, without ſome external force impreſs'd. So that we ſee external force is neceſſary to put a body at reſt in motion, tho' there ſhou'd be no ſuch thing as a *vis inertiæ* inherent in or eſſential to that body. Therefore I conceive the author is wrong in ſaying, that becauſe of this reſiſtance matter would remain in a ſtate of reſt or motion for ever, unleſs altered by ſome external cauſe or agent; for was there no ſuch reſiſtance in matter, a real force would be neceſſary to put it in motion, becauſe 'tis of itſelf inactive, and deſtitute of a power of ſelf-motion. He ſays alſo, " if matter was diveſted of its reſiſtance, it " wou'd be fit for none of thoſe uſes 'tis now fit " for; that the material world, a plant, or (par- " ticularly) an animal body, wou'd be impoſſible " things without it; and, in fine, that matter, as " a ſolid extended ſubſtance, muſt reſiſt." It may be very proper to obſerve here, that the word reſiſtance

tance is by the author in the following paragraphs, frequently made to ſtand for two very different things, and then uſed in his arguments, as tho' one and the ſame thing only was intended by it. As for inſtance, in the beginning of this paragraph, the word reſiſtance is made to ſtand for that idea we have of matters reſiſting any change of ſtate, of reſt, or motion, or its *vis inertiæ*; and the ſame word in the latter part of this paragraph cited above, ſtands for that idea we have of the abſolute impoſſibility of one body, or piece of matter's penetrating the ſolid extended dimenſions or ſubſtance of another body or piece of matter, which are two things as different as any two in nature. And tho' 'tis true in this laſt ſenſe, that matter would be fit for none of theſe uſes 'tis now fit for, without ſuch reſiſtance; yet in the firſt ſenſe, reſiſtance is not at all neceſſary to make matter fit for the ſeveral uſes it was intended to ſerve. That is, a *vis inertiæ* is not neceſſarily eſſential to matter, to make it anſwer the ends for which 'twas made; tho' that reſiſtance which matter makes as a ſolid, extended, impenetrable ſubſtance, is neceſſary to fit it for theſe ſeveral uſes that is made of it. For what idea any perſon can have of body neither ſolid nor extended, or of what uſe ſuch body would be in the world, I believe is hard to conceive. Therefore, in order to judge of the ſtrength of the author's reaſoning, and the truth of his concluſions, in the following part of the ſection, 'tis neceſſary we ſhou'd carefully inform our ſelves, what the author intends by the word reſiſtance as often as he uſes it; ſince he makes it the ſign of two very different ideas, which if we are not careful to diſtinguiſh, we may eaſily be brought to embrace error inſtead of truth. For tho' we cannot poſſibly conceive, that matter can exiſt without extenſion and ſolidity, nor that matter as a ſubſtance ſolidly extended, can be diveſted of that reſiſtance it makes to be penetrated by any other piece of matter; yet it does not follow from thence, that a *vis inertiæ*, or a reſiſtance to any change of ſtate, of reſt, or motion, is eſſential to matter, tho' called by the ſame name, *viz.* reſiſtance, any more than that two things different in nature, will become one and the ſame thing, becauſe called by one and the ſame name; to ſuppoſe which is monſtrouſly abſurd.

N° 9. he ſays, "And firſt, tho' this reſiſtance "in matter, (here is meant a *vis inertiæ)* is real "reſiſtance, or certain and real force exerted, yet "it is no action in matter, nor is matter active "in exerting it: it is rather only reaction, reſiſ"tance in the propereſt ſenſe; for it is never ex"erted till matter is firſt acted upon." Anſwer, 'Tis very true, this reſiſtance is no action in matter, nor is matter active in exerting it, if the power or force of gravity is extrinſick to matter. But if this reſiſtance is eſſential to matter, as the author maintains, and is certain or real force exerted, then this certain and real force, and alſo the power that exerts it, is eſſential to matter (ſeeing no force can be exerted but by ſome power;) and then by this argument, inſtead of proving that matter cannot by any power be indued with a power or capacity of ſelf-motion, he proves that ſuch a power is eſſential to it. For that power that exerts a certain force to oppoſe a body in motion, is as much an active power, as is that power which exerts a certain force to give motion to a body at reſt. The caſe I take to be thus; all bodies in the univerſe (at leaſt as far as our knowledge extends) have a force impreſs'd upon them by gravity; or, if gravity is a principle inherent in matter, all bodies from thence have a tendency to approach each other, and unite; which force is always proportionable to the quantity of matter in thoſe bodies at the ſame diſtances from the centers of each others gravity. Now this force acting inceſſantly, makes it neceſſary, if we would move any body in a direction different from that of gravity, that we ſhou'd impreſs a new force upon it; and the ſtrength required to do this, will always be in proportion to the quantity of matter in the moving body: So that from hence we ſee, this reſiſtance is no action in matter, nor is matter active in exerting it (unleſs the power of gravity may be ſuppos'd inherent in matter;) but is owing to the inceſſant force or action of gravity upon matter.

N° 10. he ſays, "If matter were but ſimply "inactive, its acting upon other matter would be "an impoſſibility." Again, "if matter had not, "beſides bare inactivity, a force moreover to re"main inactive, the action of matter upon mat"ter would be a thing contradictory. Again, "moſt of the methods of death and ruin are ef"fected by the inactivity of moving matter, "though matter thus acts upon matter by motion; "yet it is becauſe of its very inactivity that it doth "this." As to the firſt, if matter were but ſimply inactive, why wou'd its acting upon other matter be an impoſſibility? Would its ſolidity be deſtroy'd if its *vis inertiæ* were diminiſhed or wholly taken away? Certainly no body will ſay ſo. Then for what reaſon ſhou'd we think a ſolid body in motion cannot act upon another ſolid body in its way? Let us conſider this matter a little more cloſely. Matter is a ſolid extended ſubſtance, and therefore one piece of matter cannot penetrate the ſolid dimenſions of another piece of matter. Reſt and motion are not eſſential to matter, but modifications of matter only, therefore matter is indifferent to either. Matter being an inactive ſubſtance, requires force to put it in motion: Matter or body in motion, requires as much force to ſtop it, and effect reſt, as was neceſſary to give it that motion; theſe are ſelf-evident Truths. Now ſuppoſe the force of gravity to be ſuſpended, and alſo the *vis inertiæ* to be taken away, and two bodies, one in motion, the other at reſt, placed ſo that the line of direction of the moving body might paſs thro' the centers of both bodies; then I ſay, the moving body (ſuppoſing they are both unelaſtic) will communicate ſo much of its force to the body at reſt, as is neceſſary to carry it forward with the ſame velocity the body firſt in motion moves with after ſuch communication; that is, will continue to act upon it till their motions are equal. That this wou'd be the caſe is demonſtrable; for being both ſolid and extended, the body in motion cou'd not upon its approach penetrate the other at reſt; nor could that at reſt fly from the other in motion upon the colliſion with any greater velocity than that communicated by the body firſt moved. For ſuppoſe the body in motion at the very inſtant of colliſion, impreſs'd a fourth of its velocity upon the body at reſt; it is plain it cou'd move but with a fourth of the velocity of the body firſt moved, whilſt that wou'd continue to preſs it forward with its overplus of velocity, till it had communicated as much as wou'd make their velocities equal; and with ſuch equal velocities would they move on for ever, if no external agent acted upon them, nor any impediment ſtood in their way. Thus we ſee, 'tis neither contradictory nor impoſſible for matter to act upon matter, or body upon body, ſuppoſing its *vis inertiæ* to be taken away, if its ſolidity remains, which it muſt neceſſarily do, ſo long as it continues to be matter. Again, if death and ruin were effected by the inactivity of moving matter, it would follow that all kinds of matter in motion would kill equally; the ſoft, fluid, and yielding bodies would be the inſtruments of death, as well as the hard ſolid inflexible ones, ſeeing all bodies are equally inactive. Thus it would be no ſtrange thing to hear of men being cleft with a ſword of ſoft cheeſe, or ſhot through the head with buttermilk, or boiled turnips, (pardon the expreſſion) which now would be deemed incredible ſtories; ſo that we ſee, 'tis not the inactivity of matter, but its ſolidity, to which theſe dire effects are to be aſcribed.

The deſign of N° 11. is to ſhew, That matter in motion reſiſts any change of direction. 'Tis true it does ſo; but not becauſe a *vis inertiæ* is eſſential to matter, but becauſe all matter in motion hath had ſome force impreſs'd upon it; and being a paſſive ſubſtance, muſt neceſſarily obey the direction of that force, and leſs than that force which put it in motion will not ſtop it. This only confirms what Dr. *Keil* hath ſaid in the very place cited by the author in the note (*d*); "but "as no mode or accident can of its own accord, "or by it ſelf, be deſtroyed; and as all effects pro-"duced by tranſient cauſes do remain always, "unleſs there be ſome new and extraneous cauſe "that deſtroys them; ſo likewiſe motion once "commenced, will be continued always, unleſs "it is hindered by ſome external cauſe, *&c.*"

N° 12. contains nothing but what has been already conſidered.

N° 13. he ſays, "If we conſider the ſame "quantity of matter or body A, abſolutely, and "without any reſpect to a fix'd ſtate, the reſiſ-"tance of it is immutable, and always as much

" the ſame as the ſolidity or extenſion of it, *&c.*" I grant it, if by reſiſtance he means that ſort of reſiſtance which ariſes from its ſolidity; but if by reſiſtance he means its *vis inertiæ*, or its reſiſtance to any change of ſtate of reſt or motion, which he muſt do or his argument is not to his purpoſe ; then from what has been ſaid, I think 'tis abundantly manifeſt, that the reſiſtance of matter in this ſenſe, is as far from being immutable, as any thing that is liable to change every moment of its exiſtence. For if any body on the ſurface of the terraqueous globe ſhould be removed to twice or thrice, or four times that diſtance from the earth's center ; then I ſay, the reſiſtance or *vis inertiæ* of that body, would be but a fourth, a ninth, or ſixteenth, as great as 'twas on the earth's ſurface ; which proves moſt clearly, that this reſiſtance is not immutable, but conſtantly changes as its diſtance from the earth's center doth.

The deſign of N° 14 and 15. is to ſhew, That two contrary connatus's, or tendencies, cannot poſſibly ſubſiſt in matter at one and the ſame time. He ſays, " For that a particular atom of matter " ſhou'd have a tendency to move in any one " given direction, and at the ſame time that it " ſhou'd have another tendency not to move in " that or any other direction, is to have a tenden- " cy, and not to have it, at once." But before this argument will take place, he is to prove that a *vis inertiæ* is eſſential to matter. For ſuppoſing that two ſuch contrary tendencies cannot poſſibly ſubſiſt in one and the ſame ſubject at the ſame time, yet if a *vis inertiæ* is not eſſential to matter, I ſuppoſe he will allow then, that 'tis no contradiction, and ſo not impoſſible for omnipotence to add to any ſyſtem of matter, fitly diſpoſed, a power of ſelf-motion. That he hath not proved a *vis inertiæ* is eſſential to matter, I think appears from what has been ſaid, and alſo that there is no ſuch thing inherent in and inſeparable from matter, unleſs he'll allow contrary to his former aſſertion, that gravity is a principle inherent in matter, for from thence the *vis inertiæ* manifeſtly has its origin. Moreover, it may be worth while to enquire a little into the nature of what is called tendency in bodies. The word tendency, I conceive, when apply'd to inanimate and inactive bodies, ſignifies ſome force, power or virtue reſulting either from the internal make, frame, or conſtitution of ſuch bodies; or elſe, ſome external force impreſs'd upon ſuch bodies by ſome extraneous power, which gives them that tendency. How far, and to what degree, the eſſence, internal frame, or conſtitution of matter, is capable, by the omnipotent power of the great author of our being, of any kind of force or tendency being planted in it, I conceive is perfectly beyond any diſcoveries the utmoſt efforts of the human mind can poſſibly make; becauſe the eſſence of matter is not the object of any of our ſenſes, nor can we have any ideas of bodies, or their properties, but what we acquire by our ſenſes, therefore cannot poſſibly know what properties matter by omnipotent power is capable of ſupporting. This however is ſelf-evident, matter is capable of ſome power, force, or tendency, or it is not. If it be ſaid it is not, I deſire ſome reaſon may be given why it is not. If it be ſaid it is capable of ſome power, force, or tendency, but that which it is capable of, is a negative power, force, or tendency, or a *vis inertiæ* (as the author maintains) which is inconſiſtent with any active power whatſoever; I anſwer, this *vis inertiæ* is it ſelf an active power, at leaſt whilſt exerted, which is indeſinently, or perpetually, ſays the author; and if ſo, I ſay 'tis a force or power continually in action. For that any being ſhou'd be endued with a power (let ſuch power be what it will) and continually exert that power (which the author aſſerts in N° 9) in oppoſition to any external force, and yet remain inactive, is a plain contradiction. There is no medium between activity and inactivity, action and no action, therefore there is no body in the univerſe but is either active or inactive, no body but has a power of ſelf-motion, or elſe it has not. And to aſcribe a negative power or negative activity to bodies, and at the ſame time intend by that negative power a real power, in which is lodged a capacity to exert it ſelf, is to impoſe upon our ſelves, and to conclude the powers in bodies are negative, becauſe the terms we expreſs them by are ſo. From hence 'tis plain, this tendency in bodies is a real force either lodged in the internal frame or conſtitution of bodies, or elſe a force impreſs'd by ſome extrinſick power or cauſe; therefore it cannot be thought ſurprizing, that bodies ſhould always require a certain force to move them out of their places, or to give a body at reſt motion. For 'tis certain, there is always a real force, either acting in them or upon them, in one and the ſame direction. And tho' this force or tendency is uniform, and acts always in the ſame direction, and ſo is incapable of it ſelf to change, or give a new direction to its motion; yet this tendency is not (that I ſee) at all inconſiſtent with ſpontaneous motion. For it appears not from the author's argument, that that being that endued matter with a force, or tendency to move in one conſtant direction, or left it merely inactive, and ſo ſuſceptible of any external impreſſions, cannot, if he ſee fit, endue it with a power to chuſe for it ſelf in what direction it will move, and alſo a power to move it ſelf, according to ſuch choice: I ſay, it appears not from the author's reaſoning that matter is not capable of ſuch a power; for the *vis inertiæ* of matter, or that reſiſtance it makes to any change of ſtate of reſt or motion, is either a real force or power, or it is no power, or nothing. But experience aſſures us, there is ſuch a thing; and this force or power is either eſſential to, and inſeparable from matter, or elſe 'tis a power added to matter, and made to inhere in it; or otherwiſe it ariſes from, and is the effect of ſome other thing, which acts inceſſantly upon matter. But that it is not a power eſſential to matter, or that matter is not neceſſarily a ſelf-moving ſubſtance, appears very plain from what has been already ſaid, *viz.* that the force neceſſary to put any body in motion, or to overcome its *vis inertiæ*, is always as its weight, and the weight of all bodies, or the force of gravity in them, always increaſes as the ſquares of the diſtances from the center of attraction decreaſes, and *vice verſa*; therefore this force or power is not eſſential to matter, for that which is eſſential to any thing is neither capable of intenſion or remiſſion, but this force or power is capable of both. Secondly, if it be ſaid, 'tis a force or power added to, impreſs'd upon, or made to inhere in matter only (which perhaps is the moſt probable opinion) I ſay, ſuch a power is not inconſiſtent with a ſelf-motive power neither that we know of. Let us venture to ſuppoſe then, that that force or tendency in bodies called gravity, is owing to ſome attractive power or virtue lodged or planted in matter: I ſay, tho' this attractive power, or virtue, cannot poſſibly be the cauſe of bodies moving in one particular line of direction, and at the ſame time be the cauſe of thoſe bodies moving in a line of direction contrary or different to that particular line of direction; yet ſuch an attractive power is not incompatible with a ſuperior power, *viz.* that of ſpontaneous motion being lodged in the ſame individual ſubject. For inſtance, an animal body gravitates towards the earth's center with a force proportional to its quantity of matter. The cauſe of this, according to the ſuppoſition, is, the attractive virtue which is lodged in all matter, and acts inceſſantly upon every part of it. Beſides this, an animal body has a power of moving it ſelf different from, and contrary to the former, which no doubt is owing to a very different power from the attractive one before mention'd. And tho' 'tis plainly impoſſible, that two or more contrary effects ſhou'd be the produce or reſult of an attractive virtue or power; yet 'tis no contradiction that two different powers, one ſuperior to the other, ſhou'd inhere in one and the ſame ſubject, nor that the effects produced by them ſhou'd be as different as the cauſes themſelves, tho' we know not how to account for either. Thus we ſee, tho' ſuch a force as gravity, or a *vis inertiæ* (which is the effect of it) conſtantly acts on bodies, and as it were firmly ties them to the earth; yet this force, let it be lodged where it will, is not inconſiſtent with ſpontaneous motion, but may both ſubſiſt in one and the ſame ſubject at the ſame time. Laſtly, if this power or virtue ariſes from, and is the effect of ſome other thing, which acts inceſſantly upon matter (which is the plain conſequence of the author's reaſoning, for he makes gravity ſomething extrinſick to matter, and the *vis inertiæ* is plainly the effect of gravity) then 'tis ſelf-evident, matter may by omnipotent power be capable of a ſelf-motive power's being planted in it, notwithſtanding the perpetual action of ſuch extrinſick power upon it. That is, ſuch extrinſick power is not inconſiſtent with a ſelf-motive power's being lodged in any parcel of matter fitly diſpos'd; but only makes it neceſſary, that the ſelf-motive power ſhou'd be great enough to overcome ſuch extrinſick power, and give motion to that ſyſtem of matter to which it belongs, according to the direction of the will of the being in which 'tis lodged.

N° 16. he ſays, "That gravity, attraction, e-"laſticity, repulſion, *&c.* are not powers im-"planted in matter, or poſſible to be made inhe-"rent in it; and that the effect of gravity is not "to deſtroy the reſiſtance of matter, or to make "it unreſiſting matter, but to overcome its re-"ſiſtance to be moved in certain circumſtances." I anſwer, the effect of gravity is ſo far from deſtroying that ſort of the reſiſtance of matter, which is called its *vis inertiæ*, as to be the very cauſe of its exiſtence, which I think has been already proved. Nor does it overcome any reſiſtance matter makes to be moved in any circumſtance, but only by its force puts that into motion which is in it ſelf inactive, and would for ever remain motionleſs, if not acted upon by ſome external force. Nor do I ſee any reaſon to conclude from any thing the author hath ſaid, that gravity, attraction, elaſticity, *&c.* are powers not poſſible to be planted in matter. He ſays alſo, "Any velocity "from the beginning of the fall of a heavy body, "would be a permanent ſtate of the body, if new "impulſes *ab extra* did not add ſtill further degrees "of velocity." 'Tis very true, matter being an inactive ſubſtance, can never commence motion of it ſelf; nor for the ſame reaſon can it ever move with any other degree of celerity, than what is impreſs'd *ab extra*; but this proves not that Omnipotence cannot give it a power of ſelf-motion. He ſays alſo, "this truth is alſo plain from this conſideration,

"that

"that if a body, moving more ſwiftly than another "body moves by the force of gravity, attraction, "*&c.* overtakes it, the body ſo overtaken will "make reſiſtance to the impulſe of the overtaking "body, even tho' the direction of their motion con-"ſpire." 'Tis true, the body overtaken being a ſolid extended ſubſtance, muſt reſiſt, otherwiſe the body overtaking, moving with a greater velocity, muſt penetrate the dimenſions of the body overtaken, and actually paſs through it, which is contradictory and impoſſible. But this reſiſtance is founded in its ſolidity, which is a very different thing from the *vis inertiæ* of matter, which is here meant, and what the author undertook to prove. Nor do his following inſtances prove, that matter reſiſts the force of gravity, or any force impreſs'd *ab extra*; for tho' a body moving by the force of gravity, ſhould be overtaken by another body moved with a greater force, and tho' the overtaken body wou'd reſiſt the motion of the other becauſe of its extenſion and ſolidity; yet there would be no degree of force loſt, but in both bodies taken together it would remain the ſame, for what was loſt in one would be gained in the other; and ſuppoſing they were both unelaſtic, they wou'd move on with the ſame velocity, ſo that there would not be the leaſt degree of force loſt, but communicated only, which there muſt be, if a *vis inertiæ* was eſſential to matter. The reſiſtance then that this proves eſſential to matter, is that which it makes becauſe of its extenſion and ſolidity, which is nothing at all to the author's purpoſe. The argument drawn from the momentum of bodies, we will conſider when we come to the place referred to.

The deſign of N° 17. is to enquire how far Sir *Iſaac Newton*'s Hypotheſis, that the power of gravity may be the effect of ſome fluid, or very ſubtile matter, impelling thoſe bodies we call heavy, influences the author's concluſion. And tho' the author hath ſhewn this hypotheſis is not inconſiſtent with his concluſions, and alſo that there are ſome inſuperable difficulties attend his hypotheſis, (as there will probably all kinds of hypotheſes calculated to account for the power of gravity by impulſes *ab extra*) yet this affords not the leaſt aſſiſtance towards the ſupport of his concluſions, *viz.* that a ſelf-motive power is not poſſible to be planted in matter: For 'tis one thing to point out the errors, and ſhew the inſufficiency of an hypotheſis to account for the phænomenon of gravity, and another very different one to demonſtrate that the nature of matter is ſuch, that 'tis impoſſible for even Omnipotence it ſelf to implant ſuch a power in matter.

N° 18. he ſays, " It appears that this reſiſtance " to a change of its preſent reſt or motion, is the " only tendency planted in matter, or to ſpeak " more truly, proper to it as matter; and that " it is inconſiſtent with any other connatus or " tendency to change it: So if this reſiſtance were " not in matter, it would follow, that the ſame " force, and that an infinitely little one, wou'd move " all quantities or maſſes of matter how unequal " ſoever, with equal facility, and that it would " be equally eaſy to give the ſame degree of cele- " rity to any body; or rather, that no force at " all wou'd perform this, for where no reſiſ- " tance is, no force needs be beſtow'd to over- " come it. A ſmaller or a greater maſs of matter " cou'd make no difference of reſiſtance, in that " ſuppoſition, where matter univerſally was en- " dued with no power to reſiſt: Nor could the " difference of velocities occaſion any difference

" in a thing which is equally deny'd concerning " all velocities. The whole terraqueous globe " would then make no greater reſiſtance to the " moving force than a hand-ball now doth; nay, " not an infinitely little part of that reſiſtance. " A moving body cou'd loſe nothing of its mo- " ment (if moment were poſſible on this ſuppoſi- " tion) by carrying any obvious body along with " it. Theſe are conſequences equally (and flagrant- " ly) contrary to reaſon and experience." Anſwer, This paragraph conſiſting chiefly of conſequences which the author ſays wou'd follow the ſuppoſition that this reſiſtance, or a *vis inertiæ*, is not eſſential to matter; I thought fit to tranſcribe the whole, every ſentence of it almoſt requiring an anſwer. And firſt, I ſay it doth not yet appear that this reſiſtance, or *vis inertiæ*, in matter, is the only tendency or force proper to matter, or, it ſhou'd have been ſaid, rather poſſible to be planted in matter, nor is this reſiſtance inconſiſtent with any other power to change its ſtate; I ſay, this doth not appear from any thing the author hath ſaid yet. We are now to ſee if theſe conſequences he hath drawn are contrary to reaſon and experience. That an infinitely little force wou'd move all quantities of matter, how unequal ſoever, with equal facility, I conceive is true; ſuppoſing there was no ſuch force in the univerſe as gravity conſtantly acting upon bodies, and that the medium made no reſiſtance to the motion of bodies, which we muſt take into the ſuppoſition: For to argue from experience, that unequal maſſes of matter require unequal forces to put them in motion, or, that forces proportional to the quantity of matter in different bodies, are neceſſary to put them in motion, and to ſay, therefore there is a reſiſtance in all bodies, and that eſſential to them, is plainly begging the thing in queſtion. For we all know the power or force of gravity continually acts upon all bodies, and impreſſes a force upon them in proportion to the quantity of matter they contain, and hath the ſame effects upon all bodies the author makes a *vis inertiæ* neceſſarily eſſential to bodies to produce. Let us, for inſtance, ſuppoſe two balls of lead on the earth's ſurface, and that the weight of one is to the other as one to a hundred; ſuppoſe alſo the *vis inertiæ*, or reſiſtance to any change of ſtate of reſt or motion, to be taken away, and the medium unreſiſting, other things remaining exactly as they are; I aſk, if a hundred times the force or ſtrength would not be neceſſary to give motion to the great body, that would be neceſſary to give motion to the little one? or if leſs than an hundred times the force would produce the ſame velocity in the great body, that once the force would produce in the little one? and whether theſe forces become neceſſary upon any other account than becauſe the force of gravity acts inceſſantly upon them in the proportion aforeſaid? If it be ſaid, the power of gravity is ſufficient for this (as certainly it is) I am ſure I may ſay, without the leaſt preſumption, it is not neceſſary to make a *vis inertiæ* eſſential to matter to account for any of the effects produced by matter in motion. So that if this reſiſtance were not in matter, it would not follow, as the author ſays, that then the ſame force, and that an infinitely little one, would move all quantities, or maſſes of matter, how unequal ſoever, with equal facility, unleſs we allow the power or force of gravity depends upon the *vis inertiæ*, and never acts upon matter but when this reſiſtance acts in it. Let us now examine what follows, to wit, "if this reſiſtance were not in matter, "it would be equally eaſy to give the ſame de-

“ gree of celerity to any body; or rather, no force “ at all would perform this, for where no reſiſtance “ is, no force needs be beſtowed to overcome it.” This, if true, is very ſurpriſing indeed, that an inactive maſs or body, being void of the reſiſtance called a *vis inertiæ*, ſhould of itſelf, without any force impreſs'd *ab extra*, commence motion; or, rather, as he ſays, that no force at all would perform this, that is, give a certain and real degree of celerity to any inactive body. For though, as he ſays, where no reſiſtance is, no force needs be beſtowed to overcome it; yet 'tis nevertheleſs true, that a dead inactive body, or ſubſtance at reſt, will eternally continue ſo, if ſome force *ab extra* doth not put it in motion. He ſays, “ a moving “ body could loſe nothing of its moment by carry- “ ing any obvious body along with it.” But *quere* as motion is not eſſential to matter, but a modification of it only, and as matter hath no motion but what it received from ſome force impreſs'd *ab extra*; now if any body in motion ſhould ſtrike againſt another body at reſt in its way (ſuppoſing they were both free from all kinds of external force but that impreſs'd upon the moving body) would it not communicate a part of its motion to the body in its way, and ſo much as it imparted to the other, muſt it not neceſſarily loſe of its own? He ſays alſo, “ nor could the difference of velocities occaſion any “ difference in any thing, which is equally denied “ concerning all velocities.” But pray what is denied concerning all velocities? no one, I ſuppoſe, will deny that any body moving with any velocity (though ever ſo ſmall) makes a reſiſtance to be brought to reſt, whether a *vis inertiæ* be eſſential to matter or not; unleſs the author hath denied this in the words above cited, which ſeem to imply indeed, that if a *vis inertiæ* was not eſſential to matter, then any body moving with the greateſt velocity, would make no greater reſiſtance to be brought to reſt, than any body moving with a very ſmall velocity; or any body moving with the greateſt velocity poſſible, would make no reſiſtance at all to be brought to reſt again. But give me leave to aſk, if any body ſuppoſed deſtitute of a *vis inertiæ* were made to move with a great velocity by an impreſs'd force upon a ſolid extended ſubſtance or body, whether ſuch an impreſs'd force would not conſtitute a real reſiſtance equal to the *vis inertiæ* which is ſuppoſed eſſential to matter, in order to make it thus reſiſt? or whether ſuch a body ſo moving, would not reſiſt being brought to reſt again, in proportion to the force impreſs'd to give it any certain degree of motion? If you ſay it would not, then you grant, a real poſitive effect may be produced by nothing, which is moſt abſurd. For to ſtop a body in motion, and produce reſt, is a real poſitive effect, whether the continuance of its motion be owing to ſome internal force or power, or to ſome force impreſs'd *ab extra*; but of this more hereafter. Upon the whole, theſe are conſequences that are neither contrary to reaſon nor experience; to reaſon I think I have proved they are not, and to experience they cannot be proved to be, unleſs experiments could be made where gravity acts not, and then 'twould certainly appear, that the reſiſtance matter makes to any change of ſtate of reſt or motion, is not eſſential to matter, but is cauſed by ſome force impreſs'd *ab extra*.

N° 19. he ſays, "So likewiſe any aſſignable "body, moving with any poſſible celerity, would "be ſtopt, and the whole motion quite extinguiſh'd by any the leaſt reſiſtance poſſible; or "rather, this wou'd be done by no force at all, "for having no force to continue its motion, there

" ſhou'd be nothing to be overcome, or no contrary force would be neceſſary. Let a man reflect a little in his own mind on the nature of " ſuch a conſequence as this." Anſwer, ſo ſay I, and the more he does, the more he'll diſcover the weakneſs of it. Any body moving with any poſſible celerity, wou'd be ſtopt, and the motion quite extinguiſh'd (if a *vis inertiæ* were not eſſential to matter) by no force at all, ſays the author; and his reaſon for it is, it having no force to continue its motion, there ſhou'd be nothing to be overcome, or no contrary force would be neceſſary. But I aſk, what would become of the force impreſs'd, to give it this any (or ſay the greateſt) poſſible celerity? Would it not have that force to continue its motion? or, would that force be deſtroyed by nothing? or, is it impoſſible to give or impreſs force upon a body ſuppos'd void of a *vis inertiæ*, its ſolid extenſion remaining? If ſo, 'twou'd be impoſſible to put ſuch a body in motion; and the greater reſiſtance any body made to be put into motion, 'twou'd be ſo much the eaſier to put ſuch body into motion, its capacity of motion according to this depending upon the reſiſtance it makes to be put into motion. I imagine theſe reflections will afford no evidence towards the ſupport of the author's fundamental principle. Again, any body moving with the greateſt poſſible celerity, muſt have had the greateſt poſſible force impreſs'd upon it to produce that celerity, otherwiſe the effect would be greater than its cauſe; and ſince it requires as much force to deſtroy any degree of velocity in any body as to produce it, if a body moving with the greateſt poſſible celerity could be ſtopt by an infinitely ſmaller force, or rather no force at all, here would be an exceeding great effect wrought by a cauſe infinitely leſs than it ſelf, or rather no cauſe at all, which is moſt abſurd. Hence he ſays it is palpable, that the force of moving "bodies to act on "other bodies, or what is called moment in them, "proceeds ſolely from their reſiſtance to a change "of their ſtate." I anſwer, this reſiſtance proceeds from a force impreſs'd *ab extra*, and is not owing to any thing eſſential to matter; for any force impreſs'd upon a ſolid extended ſubſtance ſufficient to put it in motion, muſt neceſſarily conſtitute ſuch a reſiſtance as we experience in moving bodies. Or (he ſays) it is their primitive reſiſtance multiplied by their celerity, or the force neceſſarily impreſs'd on them to overcome this their reſiſtance, and equal to it, and which they retain. Anſwer, 'Tis true the *momentum* of bodies, or their quantity of motion, is the product of their weight multiplied by their velocity, which weight I think I have ſufficiently proved is owing to the force of gravity acting inceſſantly upon matter, which force is always proportional to the quantity of matter in any body; ſo that the quantity of matter (which is only knowable by its weight) multiplied by the celerity, will always give the *momentum*, but does nothing towards proving a *vis inertiæ* eſſential to matter. "Nor is "there any thing (ſays he) more abſurd than that "any number of degrees of celerity, abſtractly "conſidered, or without reſiſtance, ſhould conſtitute moment; which yet the denying of what is "here ſaid would infer." Truly I think not, if I underſtand the author, whoſe meaning I take to be this, *viz.* If any body diveſted of its *vis inertiæ*, ſhould be moved with any number of degrees of celerity, to ſay ſuch body ſo moved, would have any moment or force, would be abſurd; for by abſtractly conſidered, I ſuppoſe he means abſtracted from its *vis inertiæ* only, its ſolidity and extenſion remaining as before. Anſwer, that 'tis poſſible to account for moment in moving bodies, ſuppoſing a *vis inertiæ* is not eſſential to matter is plain from what has been juſt now ſaid; and notwithſtanding what he hath ſaid to prove that $3\ C\ R = M$, and not $3\ C = M$, yet I ſay, the quantity of motion or *momentum* of any body is always as the force impreſs'd upon it *ab extra* to give it that degree of motion, and does not at all depend upon the quantity of matter in the moving body. Therefore tho' $3\ C$ is not equal to M, yet calling the force impreſs'd F, I ſay $3\ F = M$, and thus I prove it. Suppoſe two bodies, *viz.* two balls of lead on the ſurface of the earth, let the weight of one be three pounds, of the other one pound; that is, ſuppoſe one of theſe bodies gravitates towards the earth's center with a force equal to three, the other with a force equal to one; then I ſay, becauſe the great body weighs three times as much as the little one, three times the force is neceſſary to give the great body a motion in a different direction from that of gravity, that is neceſſary to give the little body the ſame degree of velocity, in the ſame different direction from that of gravity. And thus the *momentum* of the great body, or its effect upon any obſtacle, wlll be three times as great as the *momentum* or effect of the little body upon the ſame or a like obſtacle; that is, the *momentum* in both bodies is equal to the force with which they are driven or put in motion, and does not at all depend upon the quantity of matter in either body, which was to be proved. Perhaps it may be anſwered, that though the *momentum* in any moving body is equal to the force impreſs'd upon it to give it that degree of motion, yet the force neceſſary to be impreſs'd is always as the quantity of matter in the body to be moved, as in this caſe three times the force is neceſſary to give the ſame degree of velocity to the great body as is neceſſary to give the ſame degree of velocity to the little body. I anſwer, no more force is neceſſary to give motion to any body than is ſufficient to overcome its weight; that is, to overcome the force impreſs'd upon it by gravity: for though the force impreſs'd by gravity: is always as the quantity of matter in the body ſo impreſs'd, yet this is a force impreſs'd *ab extra* (as the author maintains) and therefore not any reſiſtance, or *vis inertiæ* eſſential to and inſeperable from matter. This I think is alſo a full anſwer to what is ſaid in the next paragraph, *viz.* "That force, or moment in "matter to act on other matter, is only the ſum "of all the forces impreſs'd upon it *ab extra* to o-"vercome its reſiſtance to motion, and retained by "it becauſe of its farther reſiſtance to change the "ſtate it is thus put into; and hence, as was aſſerted "N° 16. ſince matter moving by gravity, at-"traction, elaſticity repulſe, hath moment or force, "it is a plain caſe it is reſiſting in theſe motions." Here he makes moment in matter to be the force impreſs'd upon it *ab extra* to overcome its reſiſtance to motion, that is with him its *vis inertiæ*, which he ſuppoſes eſſential to matter; whereas I think I have proved this reſiſtance matter makes to be put in motion, is purely the effect of gravity acting continually upon it. That matter moving by gravity, attraction, *&c.* hath moment or force, and that it reſiſts in theſe motions is a plain caſe indeed, but the true query is, whether matter reſiſts being put into motion by the force of gravity, or whether it would reſiſt being put into motion by any other force impreſs'd, if gravity ceaſed to act upon it? But that matter acted upon by gravity, or any other force, and ſo put into motion, ſhould reſiſt being brought to reſt again, or the direction of its

motion

motion being changed, muſt be very evident to every one who conſiders matter as a ſolid extended ſubſtance, whether a *vis inertiæ* be eſſential to matter or not.

N° 21. 'tis ſaid, " This alſo confirms what was " ſaid in N° 10. that unleſs matter reſiſted a " change of ſtate, the action of matter upon mat" ter would be inconceivable, or rather impoſſi" ble." Anſwer, Matter does reſiſt a change of ſtate, and this reſiſtence in matter is always proportional to the force impreſs'd *ab extra:* for the reſiſtance here meant is a *vis inertiæ*, and not that reſiſtance which is founded in, or ariſes from the ſolidity of matter; therefore tho' matter does reſiſt a change of ſtate univerſally, at leaſt as far as our experience reaches, yet this reſiſtance is not the effect of any negative, inactive power, quality, virtue or tendency inherent in matter, but is always purely the effect of gravity, or ſome other actual force impreſs'd. And tho' the action of matter upon matter (matter being a dead inactive ſubſtance, and deſtitute of a ſelf-motive power) would be inconceivable or rather impoſſible; yet that matter, as a ſolid extended ſubſtance, ſhould act on other matter, when put into motion by ſome external force impreſs'd, or by virtue of ſome active ſelf-motive power implanted in matter by the power of the Almighty, is neither inconceivable nor impoſſible, tho' there ſhou'd be no ſuch thing as a *vis inertiæ* inherent in, and inſeparable from matter. Therefore if a body in motion ſhou'd come upon other bodies at reſt, the reſult would not be as he imagines, the intire deſtruction of motion in that body; nor would they remain one motionleſs, torpid lump; nor would they hurry on through the immenſity of ſpace for ever, as the author ſuppoſes: But the ſame force would continue for ever, without augmentation or diminution, tho' the velocity of the body firſt moved, would be as much leſs as the force communicated to the other bodies in its way; yet upon the whole, there would be the ſame degree of force, tho' divided amongſt any number of bodies whatſoever. For nothing can deſtroy or overcome force, but an equal degree of force; and matter being deſtitute of all kinds of force, the force impreſs'd upon the body firſt moved, will remain eternally, tho' communicated as above, unleſs oppoſed by ſome external force.

N° 22. 'tis ſaid, "Either matter is reſiſting "matter, or it is not; if it is reſiſting matter, "it cou'd never move it ſelf by what is ſaid in "N° 14 and 15, ſince two connatus's mutually "deſtructive of each other, could never be planted in it; and if it is unreſiſting matter, it cou'd "never move other matter, by what has been "juſt now ſaid, N° 21. unleſs that other matter "could be moved by nothing at all; and this tho' "we ſhould ſuppoſe it ſome way or other firſt moved "it ſelf." From what I have ſaid in anſwer to N° 14 and 15, it appears, that there is no reſiſtance eſſential to matter that is inconſiſtent with a ſelf-motive power; for tho' matter, as a ſolid ſubſtance, does reſiſt other matters penetrating its ſolid dimenſions, yet this ſort of reſiſtance is not inconſiſtent with a power of ſelf-motion: This with its extenſion, makes it ſuſceptible of any external force, and alſo capacitates it to retain that force, and communicate it to any material being in its way. But how, or in what manner, force or power is communicated amongſt intangible, immaterial, unextended beings, (if ſuch there be) I believe is perfectly inconceivable to us; and how immaterial beings communicate force, power, or motion to material ones, or how material beings affect immaterial, I believe is equally difficult, or rather impoſſible to account for. He ſays, if matter is unreſiſting, it cou'd never move other matter, unleſs that other matter cou'd be moved by nothing at all. Had he ſaid, if matter was unſolid or unextended, how it cou'd effect or produce motion in, or communicate it to other matter, would be inconceivable, I ſhould agree with him; but that the reſiſtance, or *vis inertiæ*, he makes eſſential to matter, ſhould be neceſſary for one body in motion to give motion to another at reſt, I confeſs is above my comprehenſion. Matter conſidered as mere matter, void of all force, power, or activity, can never effect any change in it ſelf, nor in any other matter or body; but conſidered as a ſolid extended ſubſtance (which are properties I conceive it is impoſſible to diveſt it of) with a certain degree of force impreſs'd upon it by ſome agent, nothing is more intelligible than that it wou'd act on matter at reſt in its way, with a force proportional to that with which it ſelf is actuated; (tho' how motion is communicated from one body to another, that is, how the impinging particles act on each other, and how the motion is propagated through the whole maſs, perhaps may for ever remain a ſecret to us) nor could the matter at reſt evade its force, or fly from it with any velocity but that communicated by the body firſt moved, which I conceive would be no more than would make their celerities equal.

N° 23. he ſays, "We ſhall conclude the neceſſity of the reſiſtance of matter with greater evidence, ſee the connection it hath with ſolidity it ſelf, and therefore be more familiarly convinced of it; if we obſerve what uſe it is of, both in our own and other animal bodies, in one particular reſpect, *viz.* that of progreſſive

" ſive motion; and from thence infer with reſpect " to other motions, both in animate and inani- " mate bodies, *&c.*" Anſwer, if matter did not reſiſt as a ſolid extended ſubſtance, progreſſive motion in animal bodies wou'd be impoſſible; or, at leaſt perfectly inconceivable to us. If a man's feet, every ſtep he made, penetrated the very ſubſtance of matter, we cou'd have no idea of any poſſibility of progreſſive motion in him; for his feet wou'd be immers'd or ſwallow'd as it were in the matter on which he trod, therefore ſuch a reſiſtance is neceſſary to matter to make it anſwer the ſeveral uſes made of it in the univerſe. But, pray is there no difference between this ſort of reſiſtance which ariſes from the ſolidity of matter, whereby it becomes impoſſible for one body to penetrate the ſolid dimenſions of another, and that ſort of reſiſtance which is called a *vis inertiæ*, by which is meant that property, or rather mode of exiſtence of matter, which makes it neceſſary for a certain degree of force to be impreſs'd upon matter to give it motion, or to remove it from one place to another, which are two ideas as different as any two things in nature? That a power of ſelf-motion is inconſiſtent with the firſt of theſe reſiſtances, or with ſolidity it ſelf, the author hath not attempted to prove, but very often artfully ſubſtitutes the former in the room of the latter, and then argues as tho' they were one and the ſame thing only, and ſo eſſential to and inſeparable from matter. Whether concluſions thus deduced are good, and the way of reaſoning juſt and right, every reader is at liberty to judge for himſelf. This I take to be alſo a full anſwer to every part of the next paragraph.

N° 25. he ſays, " if by any cauſe or accident, " a living creature were once detached from the

“ earth, at whatever diſtance, it wou’d be fixed “ there as in fetters, without being able to return, “ or move in any direction.” That is, as I underſtand it, ſuppoſing there were no ſuch power acting upon it as that of gravity. But how is this poſſible? If a living creature or any other body were detached from the earth, I think it wou’d not be detained at any diſtance, but would continue its motion for ever in that line of direction it was detach’d, unleſs compell’d by ſome external force to change its direction, or unleſs its motion were ſtopp’d by a force equal to its own. See Sir *Iſaac Newton*’s firſt law of motion, and *Lemma* 1ſt. He alſo ſays, “ if one offered to pull down another, “ they would meet at their common center of “ gravity, and there both remain fixed. One “ man might raiſe an hundred without any of “ them being brought to touch the earth again.” But if the power of gravity were taken away, or ceaſed to act, where wou’d the center of gravity be, and how cou’d they meet there? Or, how would one man be able to raiſe a hundred, and yet one man on the earth not be able to pull down one in the air? Wou’d the motion upwards be more eaſy than downwards? Or, what cauſe can be aſſigned for this ſurpriſing phænomenon? He ſays, “ tho’ “ our earth is pendulous in the midſt of heaven, “ our action is exerted on it as againſt a firm baſis, “ becauſe of its bulk and maſſineſs.” I ſay, not ſo much becauſe of its bulk, as becauſe of the inceſſant force of gravity, which is always proportional to the quantity of matter in the ſame circumſtances. Were the power of gravity ſuſpended, the earth would deſert its orbit, and fly off in a tangent to that part of its orbit, in which it was at the time the force was ſuſpended; and all the bodies on the earth’s ſurface wou’d, upon the leaſt ſeparation, fly off continually with that force they were ſeparated with: So that the maſſineſs of the earth, if 'twere a thouſand times as great as it is, would not make it a fit ſuſtentacle for animal bodies. Nor would it long continue a habitable planet, if there were a ſuſpenſion or ceſſation of this active univerſal force. Therefore, as the author has piouſly obſerved, we ought to reverence and adore the wiſdom, power and goodneſs of that glorious being, who hath wrought our ſecurity by wonderful power.

N° 26. 'tis ſaid, " It follows from the argument " mentioned in N° 21. if matter did not thus re-" ſiſt, that then two contradictory propoſitions " would both be true. For the leaſt atom in mo-" tion coming upon any quantity of matter at reſt, " the whole terraqueous globe, *v. g.* muſt neceſ-" ſarily carry that whole maſs along with it, with " the ſame celerity; becauſe it makes no reſiſ-" tance to be put out of a ſtate of reſt, and yet " could not carry it along, making no reſiſtance " it ſelf to continue in its own ſtate of motion, " and therefore not acting, action being the effect " of reſiſtance. Thus the ſame propoſition would be " both true and falſe at once." Anſwer, Give me leave to aſk, if 'tis probable the author conſidered that all the bodies in the univerſe are under the inceſſant influence, power, or force of gravity, when he aſſerted as above, that the ſmalleſt atom in motion, coming upon the whole terraqueous globe, muſt neceſſarily carry that whole maſs along with it, with the ſame celerity; becauſe it makes no reſiſtance to be put out of a ſtate of reſt? That is, ſuppoſing ſuch a reſiſtance, or a *vis inertiæ*, is not eſſential to matter. Verily I think tho' the power of gravity is univerſal, and acts inceſſantly on matter, this is a proof it acts not on ſpirit; and that it did not once enter into the author's thoughts,

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when he wrote the above, otherwiſe he could not think, that for want of ſuch reſiſtance being eſſential to matter, the exceeding ſmall momentum of the ſmalleſt atom in motion, ſhould be ſufficient to overcome that almoſt immenſe force, that ariſes from the mutual attraction and gravitation of the ſun, moon, earth, and the reſt of the planets and ſatellites in the ſolar ſyſtem, and to deſtroy the preſent ſituation of the earth, and give it a motion in a different direction. I would be glad to know if any man hath any idea of any power, property, or quality inherent in matter, which the author calls reſiſtance, or a *vis inertiæ*, diſtinct or different from what is called weight. If the author can demonſtrate, that if the force of gravity were annihilated, any body or maſs of matter would then require as much force to ſuſtain, remove or put it in motion, as now; or that a force proportional to the quantity of matter in any body, would then be as neceſſary as now; I will then readily acknowledge, that a *vis inertiæ* is eſſential to matter: If he cannot, all he hath ſaid, is nothing to the purpoſe. For if the force of gravity, and the weight of bodies, and their *vis inertiæ*, is the ſame thing conceiv'd in a different manner, then I ſay, the author's argument is founded on what he ſuppoſes eſſential to matter; and at the ſame time acknowledges that this ſame thing called by a different name, is ſomething extrinſick to matter, and not poſſible to be planted in it, even by omnipotent power. Again, if matter does not reſiſt, or if a *vis inertiæ* is not eſſential to matter, I conceive an atom in motion would not neceſſarily carry the whole earth, or any other body, with the ſame celerity it ſelf is moved with; becauſe as much force as the atom communicated to the body at reſt (and that it would communicate no more than would make their motions equal, is very plain to me) ſo much force, I think it muſt neceſſarily want of that impreſs'd, to put it into motion. Again, 'tis ſaid, "Let us ſuppoſe "two equal bodies encountering each other di"rectly, and with equal celerities; theſe meet"ing muſt ſtop each other, or penetrate into one "another's dimenſions." I anſwer, They would ſtop each other if unelaſtic. He ſays, "If it be "ſaid, they are ſtopped; here is a plain poſitive "effect produced by no action or cauſe, by no"thing, which is a very expreſs contradiction. "By ſuppoſition this is not the action of matter "upon matter, there being no reſiſtance on ei"ther ſide, and there is nothing elſe to which "the action can be aſcribed." I deny that this is any part of the ſuppoſition, for there is reſiſtance on both ſides; and I ſay, that matter as a ſolid extended ſubſtance muſt reſiſt. Let us not forget, that we ought to diſtinguiſh (yea muſt diſtinguiſh if we would not impoſe upon our ſelves) between this reſiſtance he ſpeaks of here, which ariſes from ſolidity, and what he ought to mean, to make his argument good for any thing, *viz.* the *vis inertiæ*, and the difficulty vaniſhes. But how is this plain poſitive effect produced by no action, or cauſe? Is not the force impreſs'd on the bodies, encountering each other, which gives them that degree of celerity they move with, an adequate cauſe of this effect? the bodies ought to be conſidered as the ſubjects in which theſe forces inhere, and to make them proper ſubjects of inheſion, nothing more is neceſſary, than ſolidity and extenſion, and two equal forces acting againſt each other, muſt neceſſarily cancel or deſtroy each other. And in this view, nothing is more plain and intelligible than that theſe oppoſite, but equal cauſes ſhould produce this effect. If we take away ſolidity and extenſion from matter, the action of body upon body (tho' ſuppoſed actuated by the greateſt poſſible power) would be inconceivable; but if theſe continue, there's not the leaſt neceſſity of making a *vis inertiæ* eſſential to matter, to account for theſe effects, or any other produced by matter in motion. Again, he ſays, "Since action, preſſure, and reſiſtance "are the ſame thing; and ſince matter on this "ſuppoſition, is incapable of action or reſiſtance, "it is equally incapable of preſſure, which ſurely is reſiſtance." I leaſt of all expected this conceſſion, *viz.* that action, preſſure, and reſiſtance are the ſame thing; I think this is directly contrary to the very purport and deſign of the author's book. If reſiſtance is action, and eſſential to matter, then action is eſſential to matter, and matter is neceſſarily a ſelf-moving ſubſtance, which is a conſequence I believe the author will not own, nor do I know of any one that will. Reſiſtance in free agents, 'tis true is action; but that reſiſtance which one ſolid body makes to another ſolid body's dimenſions, ſure is not action, tho' one body in motion may preſs another at reſt, by virtue of ſome active force impreſs'd; yet matter is not active in this, but paſſive, or acted upon. The reſiſtance the author here ſpeaks of, is that which ariſes from the ſolidity of matter, and 'tis the ſame he means in what he ſays about matter's ſhrinking up by preſſure. If matter was not ſolid (ſo far as we know) it might ſhrink up by preſſure, and, as it were, penetrate its own dimenſions, and a large body might be preſs'd on all ſides 'till 'twas no larger than the ſmalleſt atom; but what follows from this ſort of reſiſtance? we know not that a power of ſelf-motion is incompatible with ſolidity, or that it is impoſſible for both theſe to inhere in one and the ſame ſubject, nor has he at all attempted to prove it. He undertook to prove that a *vis inertiæ* is eſſential to matter, inſtead of which he ſhews that we cannot conceive how matter can act upon matter, without ſolidity being a property of matter, and then roundly concludes that a *vis inertiæ* is eſſential to matter. This, I think, is a true repreſentation of the author's way of argumentation in his firſt ſection. But ſurely this concluſion is moſt unfairly made; for by this means (if this be deemed proof) we may prove juſt what we pleaſe. Again he ſays, "therefore I conclude that matter as a "ſubſtance ſolidly extended muſt reſiſt all change "of its ſtate of reſt or motion; and that this re-"ſiſtance is as inſeparable from it as ſolid extenſion "is." Why, becauſe one body cannot penetrate the ſolid dimenſions of another body, therefore I conclude (he ſays) that matter muſt reſiſt all change of its ſtate of reſt or motion, and that this reſiſtance is as inſeparable from it as ſolid extenſion is. Anſwer, If ſolidity is incongruous to both motion and reſt, and that in an equal degree, then perhaps your concluſion may ſtand, otherwiſe I think 'tis nothing at all to the purpoſe. By which I mean, if a body at reſt is, becauſe of the impoſſibility of another body's penetrating its dimenſions, difficultly put in motion, or if a body in motion is becauſe of the ſame impoſſibility difficultly brought to reſt; then I ſay, from thence he may infer, that as ſolidity and extenſion are properties we cannot conceive matter can ſubſiſt without, therefore we cannot conceive it can ſubſiſt without a *vis inertiæ*, or a reſiſtance to all change of ſtate of reſt or motion. But as there is no ſort of connection between theſe two properties, and as the firſt may ſubſiſt without the laſt, I ſay the author's concluſion, *viz.* (that matter muſt reſiſt all change of its ſtate of reſt or motion, and that this reſiſtance is as inſeparable from matter as ſolid extenſion is) is not good, and cannot ſtand. After all that hath been ſaid, I would be glad to know if any one can demonſtrate that ſuch a property as a *vis inertiæ*, or that whereby matter is ſaid to reſiſt all change of its ſtate, whether of reſt or motion, can poſſibly be eſſential to, and inherent in matter? or whether one and the ſame property, virtue or tendency can poſſibly be the cauſe of ſuch a reſiſtance to any change in theſe two oppoſite modifications of matter, to wit, motion and reſt? And to me it ſeems abſolutely impoſſible for any power (I mean phyſical power) eſſential to matter, to be the cauſe of its reſiſting any change of ſtate of reſt and motion. For motion and reſt being two modifications oppoſite to each other, no body can poſſibly poſſeſs them both at one and the ſame individual inſtant of time; and whatſoever has a tendency to effect or produce one, muſt have a tendency to deſtroy or overcome the other; whether this tendency be planted within, or ariſes from ſomething extrinſick, the thing's the ſame, one cannot be effected without the other's being deſtroyed. Now let us ſuppoſe any body, or piece of matter at reſt, with a real and certain force to continue ſo, and this force, or tendency, is eſſential to and inſeparable from this body or piece of matter; 'tis plain it would eternally continue ſo, unleſs ſome extraneous power impreſs'd a force upon it greater than that inherent in it, and ſo put it into motion. But no one ſingle impulſe, though ever ſo great, would be ſufficient to continue it in motion long; for by the ſuppoſition there is real force or tendency eſſential to this body, and always acting in it, to effect and produce reſt, and therefore its action being continual, muſt in a ſhort time overcome the force impreſs'd by any ſingle impulſe tho' ever ſo great. If it ſhould be ſaid by any, this force or tendency changes with the ſtate of the body, to wit, from reſt to motion, and from motion to reſt, (as I think they muſt maintain who aſſert matter reſiſts all change of its ſtate, whether of reſt or motion, by virtue of this power or tendency being eſſential to and inſeparable from matter) this is to make what by ſuppoſition is eſſential to matter to depend upon its modifications, and to change, and vary, and be oppoſite and contrary to it ſelf, as its modifications (which may depend upon the will of a thouſand different agents) are changed and varied, and are oppoſite to each other, which is exceedingly abſurd. On the contrary, if we ſuppoſe any body in motion, with a real and certain force to continue ſo, and the force eſſential to it, and inſeparable from it; I ſay, nothing can deſtroy or overcome this motion, and produce or effect reſt, but a real force impreſs'd in a contrary direction, equal to the eſſential force or tendency which continues the body in motion. But then one ſingle impulſe would produce reſt but for an inſtant only, becauſe the tendency or force being eſſential to the body, it would act inceſſantly upon it, and ſoon recover the motion the oppoſite force had impeded; therefore, I ſay, nothing would keep ſuch a body at reſt, but an oppoſite force equal to the eſſential power or tendency, and that acting inceſſantly upon it. From hence it plainly appears, that motion and reſt being two contrary or oppoſite affections, or modifications of matter, it is not poſſible for any one phyſical force, tendency or power whatſoever, by being eſſential to and inſeparable from matter, to be the true, real, efficient cauſe of matter's (as a ſubſtance ſolidly extended) reſiſting all change of its ſtate, whether of reſt or motion.

In the 27th and laſt paragraph he ſays, "Be-"cauſe the great hinge upon which all turns in the "preſent ſubject is the proving that a *vis inertiæ*, "or reſiſtance to a change of its preſent ſtate of "reſt or motion, is eſſential to matter, *&c.*" How unſafe it was for the ingenious author to truſt his large ſuperſtructure upon this foundation, (which I may now venture to call a ſandy one) what I have ſaid above of the impoſſibility of any force or tendency procuring theſe contrary and oppoſite effects, I ſuppoſe will ſufficiently demonſtrate. And here I may obſerve, that all the reaſoning the author hath uſed againſt the poſſibility of two contrary *connatus's* or tendencies, being planted in matter at the ſame time, may be uſed with as good ſucceſs againſt any tendency's being planted in matter, which ſhall produce or effect, cauſe and continue equally theſe two contrary effects, or modifications of matter, motion and reſt. Hence we may rationally conclude, that, tho' all bodies perſevere in their ſtate of reſt, or uniform motion in a right line, unleſs by ſome impreſs'd force they are made to change that ſtate, according to the firſt law of motion eſtabliſhed by the great Sir *Iſaac Newton*; yet a *vis inertiæ*, or a reſiſtance to all change of ſtate of reſt or motion, is not eſſential to matter, nor to be aſcribed to any force or tendency inherent in matter, but to the agency of ſome external power. Nor does this at all interfere with, or contradict that law; for all that can be deduced from that law is, that matter is a ſubſtance perfectly paſſive, and its ſtate or condition, as to motion or reſt, is according to the force impreſs'd *ab extra*, which I think is perfectly inconſiſtent with any tendency or power's being eſſential to matter and inſeparable from it. All that is demonſtrable from this is, that a ſelf-motive power is not eſſential to matter; or that matter may ſubſiſt without ſuch a power's inhering in it, and that matter of it ſelf can never become ſo. But that the nature of matter is ſuch, that omnipotence cannot poſſibly endue it with a ſelf-motive power, and thoſe other properties or faculties we aſcribe to ſpiritual ſubſtances, is not demonſtrable from any of the known properties or affections of matter, is an opinion that will probably find entertainment in the minds of ſome men of free thoughts, to the end of the world. And 'tis altogether as probable, that men of warm heads, and great zeal, will continually brand them with the infamous character of endeavouring to ſubvert all religion natural and revealed; and perhaps ſome may not eſcape the imputation of downright atheiſm. I would not have it thought I hereby intend to caſt any reflection on the author, whoſe charity (for any thing I know) is as extenſive as his ingenuity, and then I am ſure no one can juſtly ſay he wants either. The laſt words of the author's firſt ſection are theſe, *viz.* "and therefore all the reaſoning from "the beginning of the ſection hitherto, ſo far "as it was conditional, or depended upon proving that the *vis inertiæ* was eſſential to matter, "becomes now abſolutely demonſtrative; and "whatever other truths or conſequences can be "fairly drawn from this principle hereafter, "muſt be ſuch as we may confidently rely "upon." Here it is to be obſerved, the author acknowledges that the great hinge upon which all turns in the preſent ſubject is, that a *vis inertiæ* is eſſential to matter. But if what hath been ſaid doth prove that he hath not demonſtrated it to be ſo, and alſo that it is not eſſential to matter, but depends upon the power or force of gravity for the degree of its reſiſtance, and that this reſiſtance doth not ſubſiſt without it (which, [illegible] think, is very apparent from what has been ſaid ;) then it follows, that this his fundamental principle being proved falſe, his conditional reaſonings, and all the conſequences deduced from this principle in the remaining part of his book, ſo far as they depend upon the proof of this principle, muſt remain unproved, and without foundation.

I am very ſenſible how much I have treſpaſſed upon your more valuable time, and will beg leave only to ſubſcribe my ſelf,

SIR,

Your moſt humble Servant,

7 JU66

Joſ. Wimpey.

FINIS.